

Enhancement of Mechanical Properties of Medium Carbon Steel by Formation of Ultra- fine Bainitic Microstructures

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May 5, 2020

Abstract

In this work, ultra-refined bainitic structures are obtained in medium carbon steel through control of alloy design (Si and Al content) and low temperature isothermal bainitic transformation heat treatment. The chemical design of the steel was modified by using varying Al ratios and the steel was heat treated by isothermal transformation. The tensile strength and ductility were found to improve significantly, and this was owed to modification of the cementite morphology from plate-like to spheroidal morphology. In addition, grain refinement was achieved by fine bainitic structures generated through the heat treatment process. This new technology will have promising results to the steel industry in terms of saving time and energy, enhancing the mechanical properties and reducing the total production cost.

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